WHAT IS CLAIMED IS:

1. A pair of measuring electrodes, comprising a first and a second electrode, and an insulation layer arranged between the electrodes, wherein one or more nanopores are provided in the second electrode, and wherein the nanopores extend through the insulation layer to the first electrode, the surface of which is at least partially uncovered by the nanopores.

2. The pair of measuring electrodes according to claim 1, wherein the electrodes are sheet-like.

3. The pair of measuring electrodes according to claim 1, wherein the nanopores are distributed regularly.

4. The pair of measuring electrodes according to claim 1, wherein the nanopores are distributed randomly.

5. The pair of measuring electrodes according to claim 1, wherein the nanopores have an opening width selected from the range of approximately 20 to approximately 500 nm.

6. The pair of measuring electrodes according to claim 1, wherein the nanopores have an opening width selected from the range of approximately 100 nm.

7. The pair of measuring electrodes according to claim 1, wherein the insulation layer has a thickness selected from the range of approximately 10 to approximately 200 nm.

8. The pair of measuring electrodes according to claim 1, wherein the insulation layer has a thickness of approximately 50 nm.

9. The pair of measuring electrodes according to claim 1, wherein the electrodes have a diameter selected from the range of approximately 1 µm to approximately 10 mm.

10. The pair of measuring electrodes according to claim 1, wherein the electrodes have a diameter of approximately 10 µm.

11. The pair of measuring electrodes according to claim 1, wherein the electrodes are applied to an insulating substrate.

12. The pair of measuring electrodes according to claim 11, wherein the insulating substrate comprises at least one of glass, silicon/silicon oxide, and a polymer.

13. The pair of measuring electrodes according to claim 1, wherein the electrodes contain metal.

14. The pair of measuring electrodes according to claim 13, wherein the electrodes contain at least one of gold, platinum, palladium, iridium, carbon, and a carbon compound.

15. The pair of measuring electrodes according to claim 1, wherein the insulation layer includes a silicon compound or a polymer layer.

16. The pair of measuring electrodes according to claim 1, wherein the nanopores form a proportion of at least approximately 5% of the surface area of the first electrode.

17. The pair of measuring electrodes according to claim 1, wherein the nanopores form a proportion of at least 60% of the surface area of the first electrode.

18. A pair of measuring electrodes, comprising a first and a second electrode, and an insulation layer arranged between the electrodes, wherein one or more nanopores are provided in the second electrode, wherein the nanopores extend through the insulation layer to the first electrode, the surface of which is at least partially uncovered by the nanopores, and wherein the nanopores have an opening width selected from the range of approximately 20 nm to approximately 50 nm.

19. The pair of measuring electrodes according to claim 18, wherein the electrodes are substantially sheet-like.

20. The pair of measuring electrodes according to claim 18, wherein the nanopores have an opening width of approximately 100 nm.

21. A pair of measuring electrodes, comprising a first and a second electrode, and an insulation layer arranged between the electrodes, wherein one or more nanopores are provided in the second electrode, wherein the nanopores extend through the insulation layer to the first electrode, the surface of which is at least partially uncovered by the nanopores, wherein the nanopores have an opening width selected from the range of approximately 20 nm to approximately 500 nm, and wherein the insulation layer has a thickness selected from the range of approximately 10 nm to approximately 200 nm.

22. The pair of measuring electrodes according to claim 21, wherein the electrodes are substantially sheet-like.

23. The pair of measuring electrodes according to claim 21, wherein the nanopores have an opening width of approximately 100 nm.

24. The pair of measuring electrodes according to claim 21, wherein the insulation layer has a thickness of approximately 50 nm.

25. A biosensor comprising at least one pair of measuring electrodes, wherein the pair of measuring electrodes comprises a first and a second electrode and an insulation layer arranged between the electrodes, wherein one or more nanopores are provided in the second electrode, and wherein the nanopores extend through the insulation layer to the first electrode, the surface of which is at least partially uncovered by the nanopores.

26. The biosensor according to claim 25, wherein the at least one pair of measuring electrodes is arranged on a substrate.

27. The biosensor according to claim 26, further comprising at least one additional electrode arranged on the substrate, wherein the additional electrode serves as a reference electrode or counterelectrode.

28. The biosensor according to claim 27, wherein the additional electrode has a surface area which is greater than the surface area of the second electrode.

29. The biosensor according to claim 27, wherein the additional electrode has a surface area which is at least 10 times greater than the surface area of the second electrode.

30. The biosensor according to claim 25, wherein the biosensor is designed as a chip with supply lines for the electrodes.

31. A biosensor comprising at least one pair of measuring electrodes, wherein the pair of measuring electrodes comprises a first and a second electrode and an insulation layer arranged between the electrodes, wherein one or more nanopores are provided in the second electrode, wherein the nanopores extend through the insulation layer to the first electrode, the surface of which is at least partially uncovered by the nanopores, and wherein the nanopores have an opening width selected from the range of approximately 20 nm to approximately 50 nm.

32. The biosensor according to claim 31, wherein the at least one pair of measuring electrodes is arranged on a substrate.

33. The biosensor according to claim 32, further comprising at least one additional electrode arranged on the substrate, wherein the additional electrode serves as a reference electrode or counterelectrode.

34. The biosensor according to claim 33, wherein the additional electrode has a surface area which is greater than the surface area of the second electrode.

35. The biosensor according to claim 33, wherein the additional electrode has a surface area which is at least 10 times greater than the surface area of the second electrode.

36. The biosensor according to claim 31, wherein the biosensor is designed as a chip with supply lines for the electrodes.

37. A biosensor comprising at least one pair of measuring electrodes, wherein the pair of measuring electrodes comprises a first and a second electrode and an insulation layer arranged between the electrodes, wherein one or more nanopores are provided in the second electrode, wherein the nanopores extend through the insulation layer to the first electrode, the surface of which is at least partially uncovered by the nanopores, wherein the nanopores have an opening width selected from the range of approximately 20 nm to approximately 500 nm, and wherein the insulation layer has a thickness selected from the range of approximately 10 nm to approximately 200 nm.

38. The biosensor according to claim 37, wherein the at least one pair of measuring electrodes is arranged on a substrate.

39. The biosensor according to claim 38, further comprising at least one additional electrode arranged on the substrate, wherein the additional electrode serves as a reference electrode or counterelectrode.

40. The biosensor according to claim 39, wherein the additional electrode has a surface area which is greater than the surface area of the second electrode.

41. The biosensor according to claim 39, wherein the additional electrode has a surface area which is 10 times greater than the surface area of the second electrode.

42. The biosensor according to claim 37, wherein the biosensor is designed as a chip with supply lines for the electrodes.

43. An electrochemical cell comprising a biosensor, wherein the biosensor comprises at least one pair of measuring electrodes, wherein the pair of measuring electrodes comprises a first and a second electrode and an insulation layer arranged between the electrodes, wherein one or more nanopores are provided in the second electrode, and wherein the nanopores extend through the insulation layer to the first electrode, the surface of which is at least partially uncovered by the nanopores.

44. The electrochemical cell according to claim 43, wherein the cell comprises a receiving space for an electrolyte, and wherein the electrolyte includes molecules to be recorded using the biosensor.

45. The electrochemical cell according to claim 43, wherein the cell comprises terminals for a readout circuit.

46. The electrochemical cell according to claim 45, wherein the readout circuit is a potentiostat circuit.

47. An electrochemical cell comprising a biosensor, wherein the biosensor comprises at least one pair of measuring electrodes, wherein the pair of measuring electrodes comprises a first and a second electrode and an insulation layer arranged between the electrodes, wherein one or more nanopores are provided in the second electrode, wherein the nanopores extend through the insulation layer to the first electrode, the surface of which is at least partially uncovered by the nanopores, and wherein the nanopores have an opening width selected from the range of approximately 20 nm to approximately 50 nm.

48. The electrochemical cell according to claim 47, wherein the cell comprises a receiving space for an electrolyte,

and wherein the electrolyte includes molecules to be recorded using the biosensor.

49. The electrochemical cell according to claim 47, wherein the cell comprises terminals for a readout circuit.

50. The electrochemical cell according to claim 49, wherein the readout circuit is a potentiostat circuit.

51. An electrochemical cell comprising a biosensor, wherein the biosensor comprises at least one pair of measuring electrodes, wherein the pair of measuring electrodes comprises a first and a second electrode and an insulation layer arranged between the electrodes, wherein one or more nanopores are provided in the second electrode, wherein the nanopores extend through the insulation layer to the first electrode, the surface of which is at least partially uncovered by the nanopores, wherein the nanopores have an opening width selected from the range of approximately 20 nm to approximately 500 nm, and wherein the insulation layer has a thickness selected from the range of approximately 10 nm to approximately 200 nm.

52. The electrochemical cell according to claim 51, wherein the cell comprises a receiving space for an electrolyte, and wherein the electrolyte includes molecules to be recorded using the biosensor.

53. The electrochemical cell according to claim 51, wherein the cell comprises terminals for a readout circuit.

54. The electrochemical cell according to claim 53, wherein the readout circuit is a potentiostat circuit.

55. A method of manufacturing a pair of measuring electrodes, comprising:

a) applying a first electrode to an insulating substrate;

b) applying an insulation layer to the first electrode;

c) masking the insulation layer using a nanostructured shadow mask made from nanoparticles;

d) applying a second electrode to the insulation layer, without any electrode material being deposited in the region of the nanoparticles, wherein the second electrode has a layer thickness in the region of the radius of the nanoparticles;

e) removing the nanoparticles; and

f) etching the insulation layer as far as the first electrode, wherein the second electrode serves as an etching mask.

56. The method according to claim 54, wherein, prior to step c), the surface of the insulation layer is pretreated in order to achieve a uniform distribution of the nanoparticles on the surface.

57. The method according to claim 55, wherein the first electrode is substantially sheet-like.

58. The method according to claim 55, wherein the first electrode has a layer thickness selected from the range of approximately 50 nm to approximately 1000 nm.

59. The method according to claim 55, wherein the first electrode has a layer thickness selected from the range of approximately 100 nm to approximately 200 nm.

60. The method according to claim 55, wherein the nanoparticles have a diameter selected from the range of approximately 20 nm to approximately 1000 nm.

61. The method according to claim 55, wherein the nanoparticles have a diameter of approximately 100 nm.

62. The method according to claim 55, wherein the second electrode has a thickness selected from the range of approximately 20 nm to approximately 500 nm.

63. The method according to claim 55, wherein the thickness of the second electrode is approximately 50 nm.

64. A method of manufacturing a pair of measuring electrodes, comprising:

a) applying a first electrode to an insulating substrate;

b) masking the first electrode using a nanostructured shadow mask made from nanoparticles;

c) applying an insulation layer to the first electrode, without any insulation material being deposited in the region of the nanoparticles;

d) applying a second electrode to the insulation layer, without any electrode material being deposited in the region of the nanoparticles, wherein the second electrode has a layer thickness in the region of the radius of the nanoparticles; and

e) removing the nanoparticles.

65. The method according to claim 64, wherein the first electrode is substantially sheet-like.

66. The method according to claim 64, wherein the first electrode has a layer thickness selected from the range of approximately 50 nm to approximately 1000 nm.

67. The method according to claim 64, wherein the first electrode has a layer thickness selected from the range of approximately 100 nm to approximately 200 nm.

68. The method according to claim 64, wherein the nanoparticles have a diameter selected from the range of approximately 20 nm to approximately 1000 nm.

69. The method according to claim 64, wherein the nanoparticles have a diameter of approximately 100 nm.

70. The method according to claim 64, wherein the second electrode has a layer thickness selected from the range of approximately 20 nm to approximately 500 nm.

71. The method according to claim 64, wherein the layer thickness of the second electrode is approximately 50 nm.

72. A method of manufacturing a pair of measuring electrodes, comprising:

a) applying a first electrode to an insulating substrate;

b) applying an insulation layer to the first electrode;

c) applying a nanostructured second electrode to the insulation layer; and

d) etching the insulation layer as far as the first electrode, wherein the second electrode serves as an etching mask.

73. The method according to claim 71, wherein the first electrode is substantially sheet-like.

74. The method according to claim 71, wherein the layer thickness of the first electrode is selected from the range of approximately 50 nm to approximately 1000 nm.

75. The method according to claim 71, wherein the layer thickness of the first electrode is selected from the range of approximately 100 nm to approximately 200 nm.

76. A method of manufacturing a pair of measuring electrodes, comprising:

a) applying a first electrode to an insulating substrate;

b) applying an insulating layer to the first electrode;

c) applying a second electrode to the insulating layer; and

d) producing nanopores in the second electrode, extending through the insulation layer to the first electrode, wherein the surface of the first electrode is at least partially uncovered by the nanopores.

77. The method according to claim 75, wherein the first electrode is substantially sheet-like.

78. The method according to claim 75, wherein the layer thickness of the first electrode is selected from the range of approximately 50 nm to approximately 1000 nm.

79. The method according to claim 75, wherein the layer thickness of the first electrode is selected from the range of approximately 100 nm to approximately 200 nm.